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EXTENSION WORK IN ENTOMOLOGY

Extension Subject-Matter Seminar Conference
February 27, 1946

Reserve

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BACKGROUND

Importance of Field

Every crop, every animal, and all products of both plants and animals, as well as every man, woman and child in the United States, are subject to attack by insects. In addition to the direct damage by insects and the annoyance caused by them, they carry diseases of plants and animals, including man. It has been conservatively estimated that 5 percent of all animals and 10 percent of all crops are destroyed by insects. Despite the fact that the public spends more than \$100,000,000 each year for insecticides, the annual loss from insects amounts to several billion dollars.

Possibly the most accurate approximation of damage to any one crop by insects is the Bureau of Agricultural Economics' estimate of losses to cotton from cotton insects. According to this estimate the average annual reduction from full yield over a 21-year period was 13.1 percent. This means that for every 7 bales the grower harvests, cotton insects have taken 1 bale, or that the combined loss of lint and seed averages \$230,546,000 each year. Cotton insects can be satisfactorily and economically controlled, as shown by experimentation and by field demonstrations.

The records compiled by meat packers show that cattle grub causes almost 13,000,000 pounds of beef to be trimmed from carcasses annually and to be condemned by Federal meat inspectors. Cattle grubs damage 35 percent of all hides, and were it not for cattle grubs the leather goods situation would not be so critical. Our national loss of meat, milk, and leather because of cattle grubs amounts to more than \$50,000,000 annually. Satisfactory and economical control measures have been developed which, if taken full advantage of by farmers, would practically eliminate the loss from heel fly.

The damage from insect pests and the lack of sufficient bees and other pollinating insects to pollinate certain crops adequately are very important factors in any agricultural economy. Governmental agencies are trying hard today to find enough legume seeds to meet domestic and foreign demands. This shortage is due in part to diminishing yields per acre brought about largely by improper pollination and by damage from insect pests. As an example of how yields have been reduced, I should like to quote from a recent Utah publication:

"The history of alfalfa seed production in Utah since 1925 has been one of gradually declining yields. In that year, Utah's 22-million-pound crop has about 40 percent of the Nation's total production, while the estimated 3½ million pounds produced in 1943 was only 5.4 percent of the total production of the United States. Equally striking has been the drop in per-acre yield from 400 to 110 pounds."

JUL 10 1946

Also, some of the Wisconsin workers stated recently that the yields in that State had diminished to a point where the 1944 alfalfa seed crop would be inadequate to meet their 1945 needs. Some preliminary experiments in both Utah and Wisconsin to control the Lygus bugs that damage the alfalfa seed crop gave very promising results.

Stored-grain pests destroy entirely too much of the grain produced, especially in the South. Grain pests have been reported to destroy as much as 25 percent of the crop in some areas. Where is the logic in spending money for fertilizers to increase yields of grain 10 percent and than allowing insects to destroy 25 percent of the total harvested crop? The loss would be much greater if an attempt were made to hold the grain until later in the Spring when work animals need grain most. Economical and satisfactory control measures are available. The Extension Service has an entomological job to help prevent this loss.

Estimate the annual loss in your home from damage by clothes moths and carpet beetles to that suit, sweater, fur piece, rug, or upholstery. Multiply that by the number of families in the United States and approximate our national loss from these pests. This is a preventable loss which is practically disregarded except for the purchase of some sweet-scented concoction to hang in the closet, or to sprinkle around at dosages too weak to have any effect on the insects. Satisfactory control measures are available and should be used.

These few cases will serve to illustrate the needless waste occasioned by insect pests, though similar estimates could be made on the damage by insects to our field crops, vegetables, orchards, forests, building timbers, stored products (foods, fabrics, furs), livestock, man and his health.

Relationship With Bureau

At present the relationship between the Extension Service and the Bureau of Entomology and Plant Quarantine is the best it has ever been since the extension entomology project was started 15 years ago. The salary and expenses of the specialist are assumed by the Extension Service, and the cost of secretarial help, office space, and equipment is assumed by the Bureau. The specialist is administratively responsible to the Extension Service and to the Bureau of Entomology and Plant Quarantine for subject-matter information. The Bureau personnel, from the Chief on down, are always ready and willing to give wholehearted support to the work of the Extension entomologist. The Extension entomologist assists the Bureau in the preparation of informational leaflets, films, exhibits, and other educational material, and also assists in extending the research information developed in the Bureau, and brings to the Bureau information gathered from the different State workers.

Relationship to Field Programs of the Bureau

In addition to research work carried on by the 12 research divisions, the Bureau is responsible for all foreign and domestic plant quarantines and has 18 control projects under way. These are: Grasshopper, Mormon Cricket, Chich Bug, Armyworm, Barberry Eradication, White-fringed Beetle,

Sweetpotato Weevil, Mole Cricket, Pink Bollworm, Pear Psylla, Phony Peach, Peach Mosaic, Japanese Beetle, Mexican Fruitfly, Hall Scale, Dutch Elm Disease, Blister Rust, Gypsy and Brown-tail Moth. Extension should have an interest in all these and help to facilitate them in every way possible.

Relationship With Industry

Because entomology has such a wide application, the Extension specialist is obligated to recognize and work with a great many industrial agencies, such as insecticide manufacturers and distributors, grain-milling interests, grain elevator operators, cotton ginnermen, oil crushers and warehousemen, livestock accident prevention boards, commission men and packers, fruit-packing interests, and vegetable canneries. By cooperating with such agencies, the specialist can help them better to understand insect control so that they may stock recommended insecticides and in general support the recommendations of the State and Federal research people.

Examples of Industrial Relations

In some cases vegetable canneries purchase insecticides and applicators for their contract growers. The cost of these to the farmer is deducted from his crop at harvest. Within the past few years the entomologists in an increasing number of States have arranged meetings with representatives of the insecticide industry or the dealers in insecticides to discuss recommendations for insect control. Such meetings have helped in having dealers stock the proper insecticides and in the endorsement of certain general recommendations, both of which help the growers.

Complexity of Insect Control Recommendations

A partial list of proprietary products includes over 1,680 trade-named insecticides and fungicides manufactured by about 300 companies. Some 40 or 50 basic chemicals are used in processing these and other trade products. In any one State there are a hundred or more insect pests to be controlled. By taking into account the great number of insecticides, the many insects to be controlled, the different life habits of the insects, the number of crops or the livestock involved and their tolerance to insecticides, along with the climate and its effect on the insects, their hosts, and the insecticides, one can get a hazy idea of the job of the Extension entomologist.

States Carrying Projects

The regional importance and fluctuations in populations of certain insects or groups of insects limit the number of projects which can be carried out on a national basis. The entomology projects that approach national significance are projects on surveys, cooperation with industry, home garden pest control, household pest control, stored-grain pest control, and 4-H Club work. The cattle-grub control project, though receiving greatest emphasis in the Western range country, commands some attention over most of the United States. Other projects, somewhat more regional in nature, are the control of grasshoppers in the Great Plains and Western States, chinch bugs and hessian fly in the Grain Belt, cotton insects in the Cotton States, and fruit insects, commercial vegetable insects, and tobacco insects in areas where these crops are grown extensively.

JUL 13 1946

The number of States involved varies from season to season.

Number and Distribution of State Project Workers

There are 32 of the 48 States having funds set up in their budgets for the employment of extension entomologists, and 7 of those 32 States employ men who devote their full time to extension work in beekeeping. There are 36 men devoting part or full time to extension work in entomology, and 6 vacancies exist. The number of extension entomologists per State ranges from four full-time extension entomologists and one full-time beekeeping specialist in one State to one man devoting one-third of his time to extension entomology in another State. Within the last couple of years about one-fifth of the extension entomologists left the Extension Service. Most of these were young men who had demonstrated their capabilities and were attracted by industry with salaries they could not afford to turn down.

Factors Affecting Work

Economic entomology in America has developed pretty largely under public funds and has made greater progress than in any other country. But new crops, new insect pests, new insecticides, and ever changing conditions will necessitate continued and expanded research. There remains an enormous job, however, to get the general public to adopt the entomological practices which research workers have developed. Many leading farmers have learned the why and how of insect control. Our job with this group is to keep them abreast of what to do. This group, though representing only a small part of the total number of farmers, has demonstrated the merits of following established recommendations. The satisfactory way in which farmers observe the safe seeding date for planting wheat as a means of hessian fly control, the way many commercial orchardists and vegetable growers reduce the cost of production through following our insect control recommendations, and the way in which grain growers lay barriers to stop chinch bugs are examples of the acceptance of our recommendations without question.

REPORT ON 1945

High Lights of Subject Matter

The over-all pattern of insect control is gradually changing from emergency action of the application of preventive measures. To better effectuate preventive measures, it is necessary for the people concerned with the control of certain insects to know more about the distribution and levels of population of such insects. This has necessitated greater use of surveys. The surveys made by entomologists give the over-all picture for the region or State, but because insect infestations often vary in intensity in different parts of each field, each farmer should check his farm. Some progress is being made in this direction, and many farmers do examine their crops to determine the abundance of insects. The last year or so has shown that 4-H Club members can be used very effectively in making surveys of certain insects, such as cotton insects and the European corn borer. Such a program, however, cannot be developed to its fullest extent until adequate entomological help is employed and the

4-H Club leaders better understand the immediate and long-time value of surveys by juniors. Then much insect control will shift from combating insect outbreaks to preventing outbreaks.

Contacts with State Workers

Contacts with State workers were varied, but personal visits into the States were too infrequent. During 1944 the specialist visited 23 States. In three of these the visit was to attend regional or national meetings and not necessarily to work with the specialists. In 1945 the specialist visited 6 States not visited in 1944. This leaves 19 States which have not been visited for 2 years or more. About half of these States not visited had no extension entomologist with whom the Federal specialist could work.

In addition to the visits to the States, the Federal specialist met with the State specialist at the national entomology meeting and at the regional meetings. The national meeting of the Association of Economic Entomologists in 1945 was held in Dallas, Tex., in December, and about 350 registered at this meeting. Last year in addition to attending the meetings of the national association, the Federal specialist was privileged to attend all four of the branch meetings of the association. These were the Eastern, Cotton States, Pacific Slope, and North Central States branch meetings. At the national and two of the branch meetings special sessions were held by the extension entomologists.

In addition to the national and branch meetings the specialist endeavors to attend some of the regional entomological conferences, such as the Rocky Mountain Conference of Entomologists and the International Great Plains Conference of Entomologists, and also other more general meetings which are held annually to consider problems common to a given area, such as the Cumberland-Shenandoah Fruit Conference and the Northwest Crop Improvement Association meeting. While it is assumed that all States appreciate the value of their specialists attending out-of-State meetings, there are cases where certain restrictions make it almost impossible for specialists to leave their States. The uncertainty of scheduling such meetings often makes it difficult to arrange a program to best serve those who are present.

Other contacts with entomologists were made through direct correspondence and through circular letters issued by the extension entomologist. The specialist was also instrumental in having a war letter issued by the Bureau of Entomology and Plant Quarantine to inform the extension entomologists, as well as a number of entomologists in other phases of the work, of the various war orders and other war measures of interest to entomologists. When copies of the orders became available, they were obtained and mailed to the entomologists, as were all press and radio releases pertaining to entomology. These are still being mailed through the office of the extension entomologist.

In normal times the extension entomologist issues a publication known as "The Extension Entomologist," which was circulated to about 275 people interested in the extension phases of entomology. This, however, was discontinued as a war measure, but repeated requests have come from entomologists, and resolutions have been passed at meetings asking that this be reissued at the earliest possible time. Publication of this will be resumed as soon as permission is granted.

The Federal extension entomologist has also arranged a service referred to as the Exchange, whereby each State extension entomologist when he issues informational material for use in his State sends sufficient copies to the office of the Federal extension entomologist for distribution to the extension entomologists in other States. Such material is assembled and sent out at irregular intervals with a cover letter. During 1945, 14 lots containing 190 pieces of material were exchanged. It should be stated that a complete set of each lot of material received from the States is transmitted to the Chief of the Bureau of Entomology and Plant Quarantine and material of particular interest is sent to the Divisions of the Bureau especially concerned with the subject matter. In exchange I receive much material from the Bureau which is enclosed with the Exchange material and sent to the States. From this Exchange material the State specialists are kept informed of the recommendations used in other States and it shows them the type of informational material which each of the other States is preparing in the promotion of its programs. Drawings or sketches used in one State are often traced, or slightly redrawn, and used in other States. Included in the Exchange is processed material, much of which is ephemeral in nature, which would not otherwise get out of the State in which it originated. Such material contains some of our most effective teaching matter. Even though this Exchange is only a small part of the work of the Federal office, a number of extension entomologists have indicated that this service is of sufficient importance to justify the office of the Federal extension entomologist.

Subject-Matter Information Provided

The Federal specialist prepares or procures copies of reports of the regional conferences referred to above and distributes them to the extension entomologists outside of the area served by the conference.

A number of years ago the Federal specialist observed some excellent color slides of insects in certain States and finally developed a plan for making duplicates of these available to all the States. This service was so well received by the extension entomologists in the States, some of whom were doing work in plant pathology, that the Federal extension plant pathologist adopted a similar service for the extension plant pathologists and others with whom he works in the States. Just recently the Federal extension clothing specialist started an exchange of color slides. The plan as it now operates is for the State specialists to send to the Federal specialist their original slides from which a selection is made. These slides are assigned numbers, and a list carrying the number and title of each slide is made. Four duplicate sets are then made from the originals selected. One set of duplicates is broken up, and

duplicates are sent to the States in exchange for the originals lent to the Federal office. The other three sets are circulated with the list of titles to the States for examination and selection of any they may want to purchase. Purchase orders made payable to the contracting firm are routed through the office of the Federal specialist. As a result of two such exchanges, approximately 12,000 duplicates have been ordered from the 320 slides circulated. Orders for about 2,000 duplicates from 150 slides making up the third Exchange, which is now under way, have been received. In addition to the slides purchased by the extension entomologists many duplicates were purchased by county extension agents and by the departments of entomology for classroom use. Requests have been made that this service be continued.

Despite the fact that little effort has been put forth during the last few years to promote the sale of slidefilms, there were 747 copies of the 16 films on entomological subjects sold in 1945. These served their greatest usefulness when they were cut up and the individual frames mounted as 2-by 2- inch slides.

No new motion pictures on entomological subjects have been prepared recently, and the films which are available are very much out of date. Material and suggestions were provided for a number of State workers in the preparation of exhibits.

The specialist has prepared material for a number of AWI and AIS circulars. He has also worked with the Bureau in the preparation of a number of picture sheets on specific insects. Six on cotton insects just recently have been submitted for publication.

Extension Methods and Organization

The job of the extension entomologist overlaps or dovetails with that of virtually every other extension worker and varies with the crops and region. This makes it impossible to set up a national program on insect control such as the eight - point dairy program. Many good approaches to the entomological problem have been used during the past year. Only two of these, however, will be referred to briefly to illustrate how entomology projects are carried out.

In some of the commercial fruit-growing States very well-organized spray services are used. Though the plan varies from one State to another, the service in New York will illustrate the general plan. For a number of years the research and extension entomologists and the county agents have met annually and reviewed the results of the past season's work and discussed changes desired for the coming year. After such meetings the agents, with or without the help of the extension entomologists, hold growers' meetings. As the spring season begins to open, the county agents are on the road visiting key orchards to check on tree, insect, and disease development. Growers are notified of the general situation by card or by telephone, and messages needing prompt attention are often relayed from grower to grower. The grower then checks his orchard and governs his actions accordingly. The agent sends to the office of the extension entomologist each week end a report of conditions in his

county. Such information is compiled in the State office over the week end and mailed to the agents each Tuesday throughout the spraying season. They have special service from the Weather Bureau to help in timing sprays more accurately. During the spraying season meetings of small groups of growers, the county agent, and, where possible, the extension entomologist, were held in different orchards where first-hand observations were made of the insects present, the kind of spraying being done, and the effectiveness of control. The twilight hour has proved to be a desirable time for such meetings. At harvesttime many counties held tours on which visits were made to a number of orchards to observe the results. The informational material provided to support this service is the orchard spray bulletin, which in normal times is reprinted annually, a weekly spray service letter, a mimeographed report of the winter meeting of entomologists and agents, special weather reporting service, special notices by phone or wire, and radio broadcasts. There are more than a dozen major insect pests of apples, and to evaluate the spray service one need only to visit an abandoned orchard or an unsprayed home orchard where it is unusual to find a single apple tree free of insect damage. This very briefly outlines one organizational set-up. A similar service is provided for vegetable growers.

The organization for grasshopper control is set up on a somewhat different basis because certain grasshoppers migrate hundreds of miles and most effective control measures can be applied in the areas where the hoppers hatch. The hoppers on the hatching beds are small and are concentrated in smaller areas. Because the individual farmer may not always breed his own pests, the project becomes a community, State, and Federal problem. Many changes have been made in the organization for grasshopper control, but references will be made only to the current plan of operation. A Suggested Federal-State Cooperative Program for the Control of Grasshoppers, Mormon Crickets, and Chinch Bugs was drafted, outlining general policies. Then, because of the various plans under which the States operate, a memorandum was drafted for each State and signed by the Chief of the Bureau of Entomology and Plant Quarantine, the director of the State Agricultural Extension Service, the State regulatory official, and the Agricultural Research Administrator. To participate in the Federal-State cooperative project, the county sets up a formal organization each year and makes formal application for Federal bait material to control grasshoppers. In making the application the county assumes certain responsibilities pertaining to the use of the poison bait, the employment of labor, and certain other local costs. There is a Federal grasshopper control office with regional supervisors, a State leader, usually the extension entomologist, and a county leader, usually the county agent. The Federal office procures the bait materials and delivers them to the county and is in general supervision of the program and also spreads bait on certain uncultivated areas. Farmers are expected to bait their croplands. Each fall a survey is made to determine the number of grasshopper eggs laid. This information gives an idea of the size of the program needed the following year and of the threatening areas. Many factors influence the severity of grasshopper infestations and the damage they cause. Though the grasshopper infestation in 1944 was not general, the control programs saved \$22.12 for each dollar expended, or about \$22,712,325 worth of crops. A serious cause for delay in preparing the annual report of the Bureau of Entomology and Plant Quarantine on

accomplishments in grasshopper and chinch bug control stems from the fact that the State leader, who is usually the extension entomologist, has no authority to require reports from county leaders at a specific time. In a few cases, also, the report of the State leader is unduly delayed. These delays have been occurring in spite of the fact that the memorandum of understanding signed by the Director of Extension contains a clause stipulating that the cooperating State will furnish reports needed at the end of the control season. A number of States have promoted the adoption of cultural and agronomic practices that tend to retard grasshopper development, and these in effect help to prevent grasshopper outbreaks.

Results

The annual statistical summary of extension work now referred to as Extension Activities and Accomplishments gives little information on the results of the work of the extension entomologists. It does, however, state that about 3,000,000 contacts were made with farmers in one year to assist them in the control of insect pests. From other sources we have learned that about 3,600,000 head of cattle were treated for cattle grub control in 1945 out of a possible 80,000,000 which are subject to cattle grub infestation. Packers lose an average of \$3.56 a head because of grubs, and the cost of treatment is less than 10 cents a head. On this basis the cattle grub control program saved the packers, and indirectly the farmers, about \$12,000,000. If the data were available and it were possible to compute the savings accrued from all insect control resulting from Extension Service programs, the amount would be many million dollars.

SUGGESTIONS ON POSTWAR EXTENSION ENTOMOLOGY

Service to Whole Public

If this broader concept of extension entomology is accepted in postwar planning, certain trends are indicated. To promote wider acceptance of insect control, the public must know more about insects and insecticides. Extension entomology today renders a service mainly to agriculture, an industry representing approximately one-fourth of the population. Are we not now ready to consider similar service to the other three-fourths of the population comprising our urban centers? If so, in addition to the field of agricultural pest control, new phases -- or at least phases that have received little attention -- are open to Extension entomology and include insect pests of medical importance and those affecting forests, ornamentals, and the household.

Cooperation With Industry

There is every indication that industry and industrial organizations will take a more active part in entomology in this postwar period. In addition to the manufacturers and distributors of insecticides, various production and commodity organizations appreciative of the enormous waste incurred by insects will desire to contribute their part to alleviate such losses. This situation will obligate entomologists to extend and amplify their cooperative relations.

Airplane Application of Insecticides

The application of insecticides from airplanes or other aircraft will be greatly expanded now that the war is over. Much inferior equipment will be used which will give poor applications of insecticides and poor insect control. Extension entomologists will have a big job working with pilots and contracting companies to effectuate better insect control from the use of such craft, and to acquaint them with recent developments in methods and equipment for applying insecticides from the air. They must also emphasize the importance of giving careful consideration to such application because cases of poisoning of livestock and bees have been reported where drifting of insecticides to pastures and honey plants has occurred.

New Insecticides Overpopularized

The great expansion in industrial insecticide research will develop many new insecticides. Some will be popularized far beyond their realm of effective usefulness and the extension entomologists will be obliged to guide the public in the sane use of the product.

Health

Undoubtedly, as a result of our medical experiences during the war, much greater emphasis will be placed on the control of insects affecting health than was the case in the prewar period. Entomologists will be expected to take a more active part in this work than they have in the past.

Social Standards -- Bedbugs, Cockroaches, etc.

Postwar social standards will not tolerate the presence of bedbugs, cockroaches, and other annoying household pests, as has been done in the past. Extensive educational programs, both rural and urban, will need to be directed toward the control of such pests.

Buildings and Termites

An enormous building program is expected in the postwar period. New buildings must be constructed to avoid attack by termites. Simplified supplemental control methods that are available should stimulate greater interest in ridding infested buildings of termites. Preventing termite loss will necessitate a greatly expanded program.

Grain for Livestock Needs Protection

Increasing quantities of grain will be grown in the South and Southeast to support the expanding numbers of livestock being raised there. Some of the meat, milk, and other products will be for home use to support the program for better diets. Grain in this area is subject to severe damage by insects and will need to be protected both in the field and in storage. Farmers in this area are not generally familiar with control measures and the extension entomologist will need to assist in this problem.

Subsistence Gardens

As an outgrowth of the victory garden campaign the number of suburban subsistence gardens, or small farms, will probably increase. There is already much discussion of a more wholesome family life. In addition to better foods, it will include better surroundings, improved buildings, better landscaping, and more flowers. Flowers and shrubs, to fulfill their aesthetic value, must be protected from insects, and our programs must be expanded to include projects that will help this cause.

Farm Forestry

Several agencies are extending their efforts in the promotion of farm forestry and the protection of forest products. Special appropriations have been made available and almost all of the States have employed one or more extension foresters. Many kinds of insects attack farm wood lots and shade trees. To date but few of the extension entomologists have been able to devote the time to this project that it deserves.

4-H Clubs

The increasing recognition of entomology in our public welfare makes it imperative that more people know about insects. Young minds are the most receptive. Therefore entomological work with young people should be expanded. Remarkable progress has been made in 4-H entomology work in a number of States.

Grade School Needs

The increased prominence of entomology as related of our national economy during the war and the increasing amount of entomology material prepared in popular style have stimulated the interest in this subject in the grade schools. That the teachers and children may get properly oriented at the start, we must provide them with simple authentic information on entomological subjects. Schools should be encouraged in biology studies to devote more attention to economic insects common to the area.

Surveys and Insecticide Distribution

Survey information, in addition to educating the farmer, provides county agents and entomologists with material useful in conducting their insect control programs. Such information will also aid industrial people in the supply and distribution of insecticides.

Surveys - Lookout for Introduced Pests

Transportation facilities in the postwar period will be greatly accelerated and the chances for introducing pests will be greater. More intensive surveys may locate isolated introduced pests in time to effectuate their extermination, or at least to retard or prevent their spread.

Profit Incentive

Postwar commercial production of all crops and livestock may face lower market price, and to permit a sound margin of profit, the cost of production will need to be lowered. Economical insect control, both in the production of the crop and the protection of the products of the farm, is one of the important factors affecting the profits.

Pollination (Apiculture)

The diminishing yields of seed per acre of many crops will make commercial production of many seeds unprofitable when the market price returns to normal. Proper pollination is an important factor in seed production. The large-scale single-crop areas and clean-farming practices make it difficult for wild bees to survive. These factors make the honeybee almost vital to economical seed production and the perpetuation of certain crops. The need for better pollination of many plants, as well as many other phases of apiculture, will demand much more attention from beekeeping specialists and entomologists than in the past.

Program of Bureau of Entomology and Plant Quarantine

The public needs to be better informed in regard to the broad scope of the work of the Bureau and made to realize that its functions involve research, control, and quarantines.

Research: There is no hard line between research and extension. Research must carry on until results of test plots are demonstrated on a farm basis. The Bureau has indicated that it is pleased with the extension of research information but that there is about a 5 - year backlog in the extension of State and Federal experimental results.

Control: A thorough understanding between State agencies of their mutual responsibility in control activities would be of great assistance to the Bureau in making its contacts in organizing cooperative control activities.

Quarantines - The public needs to be better informed on the necessity for quarantines and the enforcement of them. Entomological educational programs should include reference to their place in our domestic welfare.

Educational Programs

Whether there are five entomology specialists per State or the part-time services of one man, entomological programs must be organized on a year-Around basis and those which overlap other fields coordinated with related specialists. All entomological programs should be understood and supported by the administrative people.

Emergency Service

In many of the States where the Extension Service does not employ an entomologist, the insect control work is of an emergency or service nature

instead of being organized for a concerted program intended to help the public recognize threatening populations of insects and to start control measures early.

Increased Personnel Needed

To adequately conduct an expanded program in extension entomology, additional personnel will be needed, entomologists who have been trained for extension work.

SOME PHASES OF WORK TO BE DONE
BY FEDERAL EXTENSION ENTOMOLOGIST IN 1946
(Mostly a Continuation of Work Started in Previous Years)

- Review projects and annual plans of work relating to extension entomology and beekeeping, which are submitted by the States, and offer suggestions for improvement.
- Review annual reports of extension entomologists and beekeeping specialists and use information contained in them.
- Issue special letters to extension entomologists.
- Cooperate with Federal specialists in related subjects and others in the preparation of program material and in carrying out such programs as the seven-step cotton program.
- Cooperate with the Bureau of Entomology and Plant Quarantine in the preparation of concise entomological informational material, folders, color picture sheets, etc.
- Cooperate with information people in the Bureau of Entomology and Plant Quarantine in the preparation of press and radio material.
- Cooperate with the Bureau of Entomology and Plant Quarantine and the Office of Exhibits in the preparation and revision of entomological exhibits.
- Cooperate with the Division of Extension Information in the preparation of entomological informational material.
- Cooperate with industry in the preparation and dissemination of entomological informational material.
- Prepare statements relating to entomology for use of extension administrative people.
- Assist in the preparation of letters relating to entomology for signatures of extension administrative people.
- Distribute press and radio releases, leaflets, circulars, and bulletins relating to entomology prepared in the Department to extension entomologists and a selected list of other entomologists.

Exchange from State to State and with the Bureau of Entomology and Plant Quarantine informational material prepared in furtherance of extension entomology programs in the States and in the Bureau of Entomology and Plant Quarantine.

Set up color slide exchange: circulate duplicates and receive orders for duplicates to extend usefulness of existing color slides.

Circulate reports of regional and special meetings of entomological nature.

Reissue house organ, The Extension Entomologist, as soon as permissible.

Assist Dr. Frutchey in work with foreign students, missionaries, etc.

Serve as chairman of Committee on Popular Entomological Education, American Association of Economic Entomologists, which in effect is extension entomology.

Attend national, regional, and special meetings relating to entomology.

Visit about half of the States this year. For the most part those to be visited have new extension entomologists, those returned from the service, or no extension entomologists.

VISITS TO STATES

While in the States the Federal specialist will work with the extension entomologists, related specialists, 4-H Club people, information specialists, and district agents; entomologists of the colleges and experiment stations; as well as those of the laboratories of the Bureau of Entomology and Plant Quarantine.

With the State extension people the specialist will--

Encourage dovetailing entomology with the broad programs.

Encourage close cooperation between extension entomologists, related subject-matter specialists, and administrative people.

Help to maintain good working relations between State workers and the Bureau of Entomology and Plant Quarantine.

Help to disseminate results of entomological research.

Assist extension entomologists with their annual plans of work and annual reports.

Discuss extension methods and techniques.

Visit and give assistance with respect to method and result demonstrations.

Assist in the preparation of illustrative educational material.

Encourage use of community leaders.

Promote entomology as a part of 4-H Club work.

Encourage greater use of local people in making insect surveys.

PROGRAMS OF STATE EXTENSION ENTOMOLOGIST

With the limited number of extension entomologists and the inability of county agents to devote the time to insect control that this phase of work warrants, the most satisfactory organization cannot be set up. Except in a few cases the organization is not adequate to produce the desired results. During 1946, therefore, much work of an emergency nature will have to be done to combat those pests which cause the greatest complaint from the public. In general the organization will be the same as for 1945 and will include many of the items listed under work of the Federal specialist but as they apply on a State and county level.

Because the concise folder-type publications have proved very popular, more of these will be issued. State people will issue their own or issue them in cooperation with adjoining States to better fit the problem in the area. The more general and descriptive type bulletins will need to be issued for the use of the leaders and better informed growers. An increasing number of color illustrations will be printed because natural color is almost a necessity in the identification of a number of insects. In this connection more color slides and motion pictures will be used in meetings and conferences. More conferences will be held with small groups of county agents to train them in the subject of insect control.

Demonstrations will continue to play an important part, because showing is one of the most convincing tools. Projects that lend themselves to group action will be participated in by related specialists and administrative people.

Some of these are:

The seven-step cotton program.

Cattle grub and louse control programs.

Home fruit and vegetable garden programs.

Grasshopper, hessian fly control, etc., where agronomic practices play an important part.

Termite control which involves agriculture engineers and foresters.

There are projects that are so involved that they can be handled better by the entomology specialists.

Some of these are:

Providing information on newer insecticides

such as:

DDT	Ryanex
DD	Sabadilla
Thianite	Benzene Hexachloride
Lethane	Piperonyl Cyclohexenone
1068	Dimethyl Phthalate

Cooperative programs with insecticide manufacturers and dealers.

4-H Club entomology work.

Conducting spray services with commercial orchardists.

Conducting spray services with commercial vegetable growers.

Insect surveys.

SUGGESTIONS FOR ADMINISTRATORS

That extension administrators make a greater effort to become familiar with the actively support all entomological programs.

That the extension administrative people more fully appreciate the need for knowing the insects to control the pests most effectively.

That greater emphasis be placed on knowing better the relation of the insect development or levels of insect population to their control.

That more well-trained entomologists be employed by the extension services to direct the extension phases of insect control work.

That the administrative people take a more active part in coordinating the related subject-matter programs in the States.

That 4-H Club leaders recognize the fact that entomology has a much broader application to club work than is usually accepted.

That research entomologists from certain field stations of the Bureau be allowed to continue to assist the State extension workers in the establishment of programs in their field. The merits of this practice have been demonstrated.